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QUARTZ FIBER MICROBALANCE

Argonne National Laboratories

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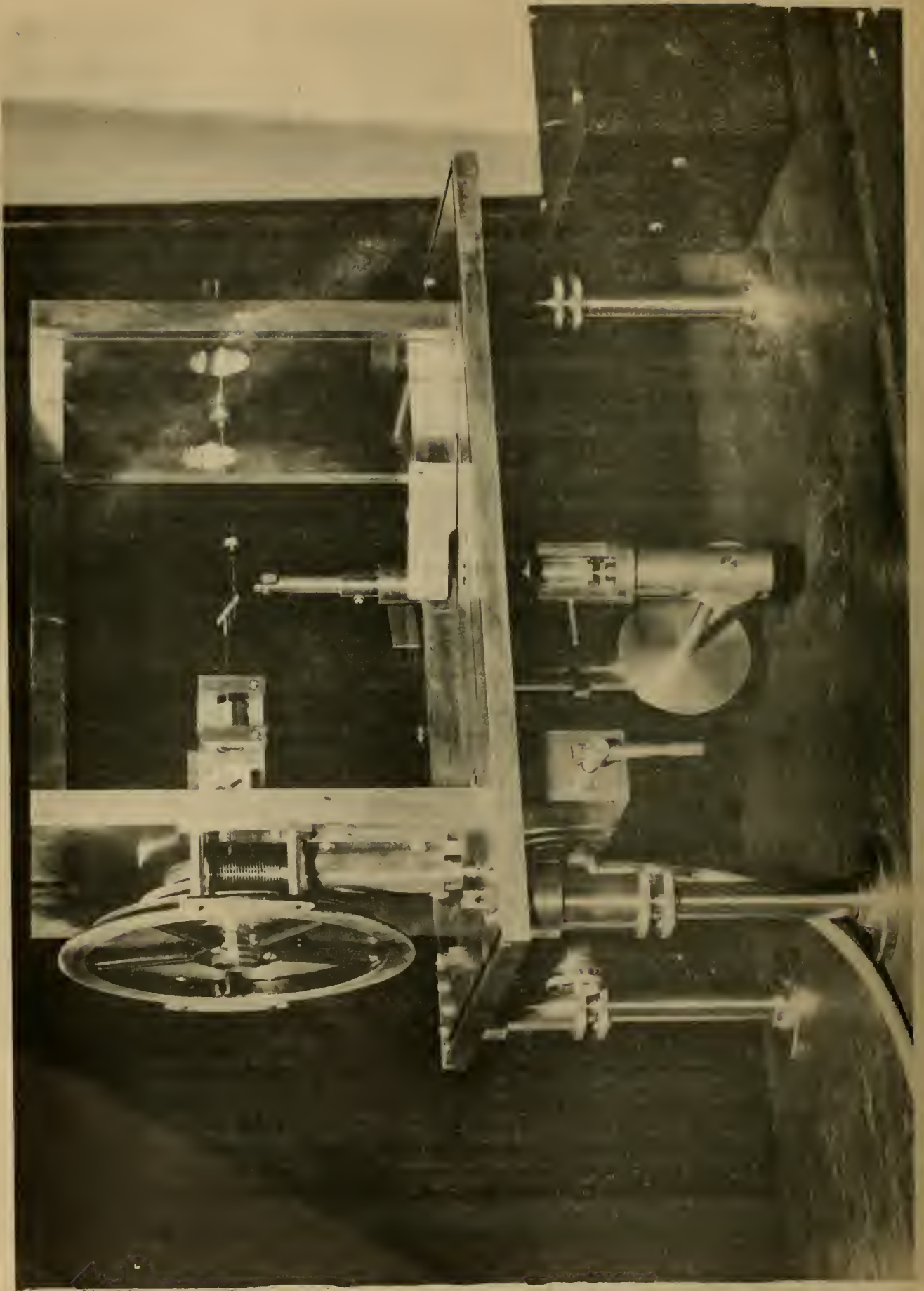
QUARTZ FIBER MICROBALANCE

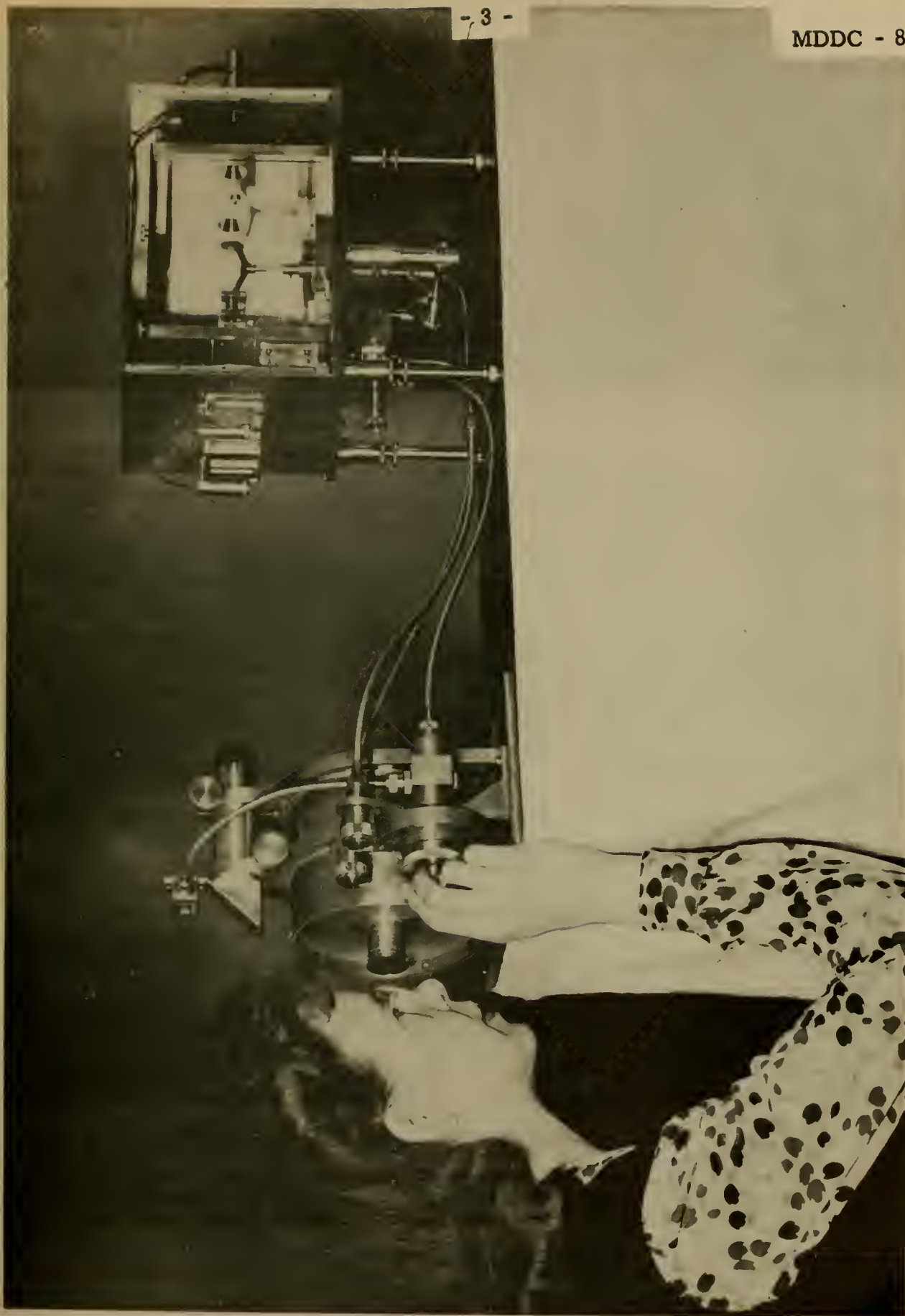
This microbalance indicates by a calibrated dial and vernier the amount of torsion necessary to bring the known and unknown weights into balance. One division on the vernier is 6×10^{-9} grams. The maximum load per pan is about 20 milligrams.

The suspension or torsion fiber, beam, and pan holders are of fused quartz construction. The suspension fiber is about 2.3×10^{-3} centimeters in diameter. Two small platinum pans hold the materials to be weighed. The unknown is balanced as closely as possible with known weights. In balancing, the oscillation of the beam damps out within 2 to 3 seconds. Then, one end of the suspension fiber is rotated until the balance is perfect. The amount of rotation is indicated on the dial and vernier.

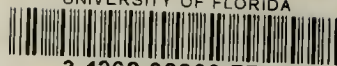
An optical system is used for observing exact balance. Two lamps with exactly centered filaments throw onto prisms the images of two segments of the index fiber. This index fiber is above the beam and parallel to it. The segments chosen for viewing are near the ends of the beam. Through a system of reflecting and combining prisms, the images of the index fiber are shown on a viewing screen for rough balance and may be viewed through an objective lens for exact balance. When viewing the balance through the objective lens, one sees a magnified image of the vernier in the left upper third of the field.

The accuracy is limited by temperature changes and by vibrations. Temperature changes are minimized by a set of 3 housings with dead air spaces between them. For extreme accuracy, the instrument should be used in a temperature-controlled room.





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